Solution to Practice 1k

A1(b) $\sqrt{(2/\sqrt{29})^2 + (-5/\sqrt{29})^2} = \sqrt{4/29 + 25/29} = \sqrt{1} = 1$

A1(d) $\sqrt{2^2 + 3^2 + (-2)^2} = \sqrt{4 + 9 + 4} = \sqrt{17}$

A1(f) $\sqrt{(1/\sqrt{3})^2 + (1/\sqrt{3})^2 + (-1/\sqrt{3})^2} = \sqrt{1/3 + 1/3 + 1/3} = 1$

A1(h) Since $\frac{1}{2}\begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 1/2 \\ 1/2 \\ 1/2 \\ 1/2 \end{bmatrix}$, the length of this vector is $\sqrt{(1/2)^2 + (1/2)^2 + (1/2)^2 + (1/2)^2} = \sqrt{(1/4) + (1/4) + (1/4) + (1/4)} = 1$.

A3(a) The distance from P to Q is the length of the vector $\vec{PQ} = \begin{bmatrix} -4 \\ 1 \end{bmatrix} - \begin{bmatrix} 2 \\ 3 \end{bmatrix} = \begin{bmatrix} -6 \\ -2 \end{bmatrix}$, which is $\sqrt{(-6)^2 + (-2)^2} = \sqrt{40} = 2\sqrt{5}$.

A3(b) The distance from P to Q is the length of the vector $\vec{PQ} = \begin{bmatrix} -3 \\ 1 \\ 1 \end{bmatrix} - \begin{bmatrix} 1 \\ 1 \\ -2 \end{bmatrix} = \begin{bmatrix} -4 \\ 0 \\ 3 \end{bmatrix}$, which is $\sqrt{(-4)^2 + (0)^2 + (3)^2} = \sqrt{25} = 5$.

A3(c) The distance from P to Q is the length of the vector $\vec{PQ} = \begin{bmatrix} -3 \\ 5 \\ 1 \end{bmatrix} - \begin{bmatrix} 4 \\ -6 \\ 1 \end{bmatrix} = \begin{bmatrix} -7 \\ 11 \\ 0 \end{bmatrix}$, which is $\sqrt{(-7)^2 + (11)^2 + (0)^2} = \sqrt{170}$.